Table 2. Effect of soil amendments on yield of maize

Treatment	Pernampet		Vaniambadi	
	Mean yield (kg/ha)		Mean yield (kg/ha)	
	GRAIN	STRAW	GRAIN	STRAW
T1 composted coir pith	3580	7190	2615	5825
T2 Cor pith (raw)	3493	7188	2596	5525
T3 Pressmud	3411	7173	2477	5400
T4 Farm yard manure	3359	7100	2431	5350
T5 Gypsum	3264	6863	2349	5375
T6 Control	3065	6175	2125	5025
C.D. (0.05)	91.6	361.4	111.9	317.4

The results of the third experiment revealed (Table 2) that there was no difference between the raw and the composted coir pith with respect to grain yields. These two treatments were superior to the rest of the amendments tried. Similar results in sugarcane were also reported by Devaraj (1991) using raw coir pith for increasing the yield of sugarcane in tannery polluted areas of North Arcot Ambedhkar district. The results had conclusively proved either the raw or composted coir pith can be used as soil amendment at 10 t/ha for increasing the productivity of maize and fingermillet in tannery effluent polluted soils.

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https://doi.org/10.29321/MAJ.10.A01580

Madras Agric. J., 81(10): 549-551 October, 1994

INFLUENCE OF NITRIFICATION INHIBITORS ON NUTRIENT AVAILABILITY, YIELD AND UPTAKE IN RICE SOILS.

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ABSTRACT

A field experiment was conducted in sandy clay loam soil to study the effect of nitrification inhibitors on nutrient availability, yield and uptake of nutrients by rice. The available nitrogen (N), phosphorous (P) and potassium (K) contents were higher in treatments with 75 per cent N as nitrification inhibitors and the rest as prilled urea (PU). The nimin coated urea (NICU) treatments showed higher grain and straw yields than neem cake coated urea (NCU) and PU treatments. Nitrification inhibitors applied treatments recorded higher N, P and K uptake than untreated urea treatment.

The low recovery rate of nitrogenous fertilizers under lowland rice cultivation is due to the system of flooding and drying of soils. Nitrogen, being the most mobile element is lost through leaching, volatilization and denitrification. One of the low cost technologies is to go in for coating urea with indigenous materials like neem products which retard nitrification and thereby make nitrogen available to the crop in a steady state for relatively longer period. Therefore, the influence of NICU and NCU on increasing the efficiency of applied N in rice soils was studied.

MATERIALS AND METHODS

The study was conducted during *kharif* season in sandy clay loam soil (Typic Haplustalf) with ADT 36 rice. The soil was neutral in reaction having 121.8, 6.1 and 165.0 ppm of available N, P and K respectively and 0.54 per cent of organic carbon.

Nitrogen at recommended level (100 kg N ha^{-1}) was applied in 3 splits, half at basal, 25 per cent at tillering and 25 per cent at panicle initiation stage. The treatment structure is given in Table 1. The nitrification inhibitors with and without PU

Table 1. Treatment structure

Treatment	Time of application		
	Basal (50 N)	Panicle initiation (75% N)	Flowering (100% N)
T1	Control		
T2	PU	PU	PU
T3	NCU	PU	PU
T4	NCU	NCU	PU
T5	NCU	NCU	NCU
T6	NICU	PU	PU
T7	NICU	NICU	PU
T8	NICU	NICU	NICU
PU	Prilled urea		
NCU	Neem cake coated urea		
NICU	Nimin coated urea		

were replicated four times in randomized block design. Fifty kg P2 05 and K2 O were added basally. Soil and plant samples were collected at tillering, panicle initiation, flowering and harvest stages. The soil samples were analysed for available N, P and K. Plant samples were analysed for total N, P and K by standard procedures.

RESULTS AND DISCUSSION

Available nitrogen (N) Treatments with nitrification inhibitors with or without PU recorded significantly higher soil available N than that of PU alone (Table 2). The treatment which received PU alone recorded significantly low available N in soil which might be due to higher volatilization losses. Treatments with 100 per cent nitrification inhibitors recorded the highest available N content and were on par with that receiving 75 per cent nitrification inhibitors and the rest as PU. Hence, application of nitrification inhibitors (NICU - 45 per cent N, NCU - 37 per cent N) at basal and at tillering stage is sufficient to meet out the N need of the crop at the initial stage of the rice growth. To supply the immediate need of rice crop at maturity, PU with quick hydrolysis was beneficial at the panicle initiation stage.

Available phosphorus (P) The nitrification inhibitors did not have much influence on the available P content, as the crop removed more or less the same quantity of P for their growth and development (Table 2).

Available potassium (K) Treatments with nitrification inhibitors together with PU registered higher content than PU alone (Table 2). Treatments that received 75 per cent nitrification inhibitors and rest as PU recorded the highest value and were on par with the treatments that received nitrification inhibitors and PU equally. The increased

Table 2. Influence of nitrification inhibitors on availabality of nutrients (ppm)

Observation	Control	PU	NCU			NICU			CD
			100%	75%	50%	100%	75%	50%	(0.05)
Soil available N									
Tillering	88.2	103.5	109.2	112.0	109.2	117.6	116.2	116.2	2.5
Panicle initiation	72.8	86.8	89.6	89.6	89.6	95.2	94.7	94.7	2.7
Flowering	70.0	82.6	88.2	88.2	85.4	91.9	92.4	91.9	3.2
Harvest	65.8	77.0	79.8	79.8	80.2	85.4	84.9	84.8	2.7
Soil available P									
Tillering	4.3	5.4	5.6	5.6	5.4	5.9	6.0	6.0	0.6
Panicle initiation	4.1	5.0	5.6	5.6	5.1	5.7	5.7	5.6	0.7
Flowering	4.1	4.6	5.0	4.9	4.5	5.1	5.1	5.2	0.7
Harvest	3.8	4.6	4.8	4.8	4.8	4.9	5.0	4.9	NS
Soil available K									
Tillering	89.3	101.0	107.5	108.8	109.3	109.6	114.3	112.7	7.0
Panicle initiation	78.8	92.5	98.8	97.5	98.8	102.5	104.6	102.5	6.0
Flowering	76.3	91.3	93.8	93.8	92.5	97.1	98.4	99.2	4.0
Harvest	63.8	72.5	77.5	76.3	75.0	80.4	82.1	80.3	4.0

Table 3. Influence of nitrification inhibitorc on yield and uptake of nutrients of rice (kg ha^{-1})

Observation	Control	PU	NCU			NICU			CD
			100%	75%	50%	100%	75%	50%	(0.05)
Yield									
Grain	3165	4986	5687	5443	5563	6003	6100	5873	233
Straw	5107	6629	7347	7893	7228	8794	9103	9124	192
Uptake of N									
Tillering	21.6	30.6	32.9	33.0	31.8	39.9	43.1	39.3	4.0
Panicle initiation	42.4	49.7	61.7	56.9	64.6	78.6	84.2	81.2	7.3
Harvest	51.1	79.0	98.1	100.2	96.1	129.0	136.1	132.0	13.4
Uptake of P									
Tillering	5.0	7.0	7.8	8.0	7.5	9.2	10.0	9.3	1.4
Panicle initiation	13.5	17.1	19.9	19.7	20.1	24.2	25.4	23.9	3.5
Flowering	18.2	21.7	23.9	23.0	22.0	27.0	28.0	26.9	4.3
Harvest	12.0	17.8	25.4	25.0	24.3	32.3	33.0	32.1	1.4
Uptake of K									
Tillering	21.5	33.2	37.2	37.8	35.0	45.1	48.3	44.9	3.7
Panicle initiation	59.3	69.8	91.2	37.7	82.0	110.3	112.5	109.1	5.4
Flowering	71.7	34.5	92.8	95.2	92.4	105.1	112.4	107.0	7.3
Harvest	97.8	146.0	176.6	189.1	170.0	215.1	227.7	223.4	19.5

availability of K was probably due to the increased concentration of NH_4^+ which might have replaced the K^+. releasing more K ions into the soil solution due to similar ionic size, (Ramakrishnan, 1987)

Grain yield The nitrification inhibitors with or without PU recorded significantly high grain yield (Table 3). This may be due to more available N in soil because of the continuous slow releases of N from these nitrification inhibitors (Vyas et al., 1991). Treatment with nitrification inhibitors alone recorded the highest grain yield and was on par with the treatment with 75 per cent nitrification inhibitors.

Straw yield The N fertilized treatments recorded high straw yield which may be due to higher N availability in these treatments. The straw yield showed similar trend with that of grain yield.

Uptake of N N applied through nitrification inhibitors enhanced the N uptake by rice over uncoated urea. Greater availability of N throughout the crop growth and lower loss of N in nitrification inhibitors applied treatment might have enhanced N uptake.

Uptake of P The treatments with N recorded higher P uptake than the control which might be due to increased root surface area as a result of N fertilization which would have resulted in increased P absorption and hence P uptake by rice.

Uptake of K Higher K uptake from N fertilized plots may be due to the replacement of K^+ by NH_4^+ which are similar in ionic radii and valency. The uptake being the product of content and dry matter production, such a result was evident since NICU and NCU increased the nutrient contents and dry matter production (Vyas et al., 1991).

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